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SCIENTIFIC BOOKS.

Geology. By T. C. CHAMBERLIN and R. D. SALISBURY. 3 vols. 8vo, illustrated. New York, Henry Holt & Co. Vol. I. *Geologic Processes and their Results.* Pp. xix + 654. 1904. Vol. II. *Earth History (Genesis-Paleozoic).* Pp. xxvii + 692. 1906. Vol. III. *Earth History (Mesozoic, Cenozoic).* Pp. xi + 624. 1906.

The appearance of this monumental work is an event of more than ordinary importance in the history of geologic book-making. The authors are men of great and varied experience in field geology in different parts of the world, and they are thoroughly skilled in handling the more abstruse problems of speculative geology. They are also too serious-minded and too actively engaged in geologic research to give their time to the preparation of a text-book or manual of geology of the ordinary type. The geologists of the country and of the world, therefore, feel that they have a right to expect in these three volumes to find geology not only brought well up to date in all its branches, but new fields pointed out for future activity, research and philosophic deduction.

But if such a work should fully meet all of the hopes and expectations of all geologists it would have to be more than human. No man and no two men can publish a text-book of 2,027 pages on geology without omitting many things that some of us think ought to have gone in, and without putting in much that some of us think ought to have been left out. In these days of specialization, too, the help of many specialists must be had in the preparation of such a book, and even the specialist is often a little behind one or another colleague regarding details of some importance in his own specialty. Aside from the matter of scientific import, the mere mechanical preparation and editing of such a book is a task of no small responsibility. But none the less authors of books that are to be taken seriously must expect to have their work scrutinized with a closeness and minuteness proportionate to the seriousness of their undertaking.

One of the most useful features of a good manual for advanced students, such as this work claims to be, is its reference to geologic literature. Two of the best manuals in the English language stand in strong contrast to each other in this respect: Dana's manual, hitherto our best American work, is notably lacking in foot-note references, while Geikie's text-book has abundant and discriminating references to the literature of every subject treated. The first two volumes of Chamberlin and Salisbury have entirely too few references to the literature of geology, and of these, too many are to text-books instead of the original sources, and where original sources are mentioned the references are sometimes not up to date. This sort of thing is allowable in elementary works, but hardly so in one of these dimensions.

The geographic part of the first volume is beautifully illustrated with colored topographic plates, a happy and thoroughly effective method of showing certain geographic features, but these plates are not accompanied by explanations, nor do they contain references to places in the text where they are explained. The text itself refers here and there to the plates, but one gets tired of hunting for plates and counting them and looking for their numbers in an effort to follow the text intelligently. Some of these plates might have been much improved by striking out certain lines from the originals. On plate XVI. (opposite p. 179, Vol. I.), for example, the heavy broken black line down the middle of the Missouri River might better have been omitted. There are but few of these otherwise beautiful illustrations that are not marred by these heavy black political boundary lines.

The language is sometimes obscure. We are no sticklers for making everything easy for the student, but we do believe in making it simple when it may as well be simple as complex and difficult to follow. Students need to give their time to thinking about the subject on hand instead of wondering what a writer is driving at. For example, at p. 265 of Vol. I., it is said that 'this dynamic source of heat may modify the theoretical deduct

drawn above from the atmospheric and internal influences.' On p. 338 it is said of waves normal to the shore that 'the advance and recoil of the water move particles toward and from the shore, but effect no transfer in the direction of the shore,' probably meaning along the shore. Again at p. 429 it is said: 'If the heat factor in metamorphism be sufficiently increased, aqueous solution may actually grade into magmatic solution through various degrees of softening and melting, and the cycle of changes be closed in upon itself.

Personally, we do not think well of the frequent personification of natural objects. For example, streams are spoken of in Vol. I. as if they had designs: they are said to struggle (p. 95), to steal (p. 98), to commit piracy, to drop out of the race (p. 96), to refuse to remain (p. 169), to have feeding grounds (p. 516), senility and death (p. 85); a lava stream chooses its direction (p. 580), and in one place a volcano is said to be 'enjoying its customary period of rest' (p. 571). This sort of language is as much out of place in geology as it would be in chemistry or physics.

While some subjects are treated with great fullness others are passed over with next to no attention. The theory of isostacy, for example, is barely mentioned twice, while the process and importance of flocculation in the deposition of finely divided sediments is only referred to on p. 360 of Vol. I. as a limited and obscure action. A brief bibliography of the subject of flocculation is given in *Nature*, LXIV., 279, and some of its obscurity has been removed by Joly and others there mentioned.

The general subject of coral reefs is dismissed (I., 630) with the remark that, 'The contribution of coral polyps to the formation of limestone is most important, and is too familiar to require elaboration here.' Most of us who think that corals form only dolomites and dolomitic limestones can not be expected to accept this dismissal of the subject as a fair disposal of it, especially in view of the promise made on p. v of the introduction Vol. I., where it is stated that 'Antecedent elementary courses in geology will not be necessary to the use of these volumes.'

There are many oversights that must annoy teachers of geology, especially in view of the fact that students, as every teacher knows, are so much disposed to regard text-books and statements in print as infallible. The following are some of the statements in Vol. I. that do not seem to be altogether above question or require modification or explanation: on page 501 it is said that 'faults rarely show themselves in the topography of the surface.' A California geologist could hardly be expected to support such a statement with a straight face. On p. 150, figure 146, a syncline is called an anticline. On p. 170 the decrease in the volume of a stream is explained in every way except the one in which we most frequently see it decreased, namely, the run-off of flood waters. It is said on p. 184 that theoretically the rotation of the earth should increase erosion on 'the right bank of streams in the northern hemisphere and the left in the southern,' when no reference is made to the direction of the streams. On p. 188 mention is made of 'the load except that in suspension,' when solution seems to be meant. The branching of streams amidst their delta deposits is explained (p. 189) by water breaking over side-levees. Some branches may possibly be so formed, but this explanation can not be accepted for the main divisions of the Mississippi at its mouth. In explaining river terraces (p. 198) no mention is made of a stream swinging back and forth across a flood plain in which it is cutting a channel. It is stated (p. 213) that the deposition of mineral matter from boiling water is the same process as that by which it is deposited upon evaporation: we have not been accustomed to think so. In listing the factors of deposition from solution no mention is made (p. 214) of either increase of temperature (with the carbonates), or of the escape of gases, such as carbon dioxide, from waters disturbed at waterfalls. On p. 218 natural bridges are called 'unique features.' The statements on p. 277 lead one to suppose that fiords are only made by glaciers.

The depression of the island of Hawaii would produce remarkably fine fiords.

In explaining the movements of sea water (p. 319) no mention is made of the lagging of waters moving over a revolving globe. On the same page the difference in densities of sea water is said to be due to differences in temperature and salinity, as if salt were the only mineral in solution in sea water. On p. 478 it is said that a dip of 40° S. 20° W. is the same as dip 40° strike W. 20° N. It may be the same, but it may also be N. 20° E., that is, in exactly the opposite direction. Moreover, it is customary to read the compass from the N. or S. end, not from E. or W. In Fig. 399 on p. 482 the strike should, therefore, read N. 80° E., instead of E. 10° N. The figure seems to be intended for a note-book record, but unless placed on a map it would be useless, for no direction is given for the dip. The writer's experience shows that dips indicated by arrows never mislead, while dips shown by plain lines (pp. 482–4) require an effort of the memory on the part of the student.

It is suggested (p. 507) that earthquakes cause the great waves that sometimes accompany shocks by thrusting their 'waters off shore by their sudden impact.' The late California earthquake was certainly violent enough to have given us an example of this kind of a wave if such a thing had been possible.

On p. 615 is 'the inference that a vegetal covering of the land extended as far back in the history of the earth as clay shales, quartz-one sandstones and limestones form the prevailing sediments.' The reasons for this inference are not clear. Long ago Daubrée demonstrated that feldspars mechanically ground up in the presence of water become kaolinized; this process would account for clay shales without the intervention of organic acids to decompose feldspathic rocks. Neither is it clear how land plants are indispensable to the formation of limestones. The carbon dioxide of waters is derived partly from the atmosphere. Lime carried to the sea by waters so carbonated would contribute to lime-secreting organisms, and limestone would thus be formed without the intervention of land plants.

The examples of deposits of diatoms (I., 625) might well include some of the great deposits such as those of the Santa Cruz Mountains of California, where they are five thousand feet thick.

In regard to the meteorite figured in Vol. II., p. 24, after Liversidge (not Liveridge) we venture to suggest the possibility of its having been artificially shaped. Its size and form appear to lend support to this idea. The authors do not say where it is described, but the original paper is in the *Jour.* and *Proc. Roy. Soc. of N. S. W.*, Vol. 36, p. 341. The description of the finding seems to preclude the possibility of its artificial origin, but experience shows that the stories associated with the finding of such things often require close scrutiny. The form of this meteorite is too unusual to be accepted without question.

In Vol. II., p. 653, the advent of the Ammonites is spoken of as occurring in the Permian. It was shown several years ago that the Ammonites were abundant in the Coal Measures (Mon. XLII., U. S. G. S., 22–28, Washington, 1903). In Vol. III. but little attention is paid to the stratigraphy of the west coast, and one might infer that the standard sections of the Mesozoic and Cenozoic were all in the eastern part of the United States. As a matter of fact, the finest sections of the Trias, Jura, Cretaceous, Miocene, Pliocene and marine Quaternary in North America are found on the west coast. One would also be led to infer from the illustrations that only land life was known in the Pleistocene of the United States, whereas marine life is certainly of equal importance and has been fully described.

The discussions that stand forth prominently in the entire work on account of their far-reaching importance and on account of the care, seriousness and comprehensiveness with which they are discussed are: (1) the planetesimal hypothesis of the origin of the earth; (2) the origin of the atmosphere; (3) the origin of the ocean; (4) of volcanic phenomena; (5) of the hydrocarbons; (6) of

Although most of the theories formally set forth in the book have now been before geologists for several years (always from these same authors), it can not be said that these theories have as yet met with general acceptance either in this country or among the geologists of other countries. They must, therefore, be regarded as still on trial in a sense. None the less, these volumes are an epoch-marking work, and the theories set forth in them must be reckoned with hereafter in every book on geology and by every teacher and every student. In spite of its two thousand pages one feels that the matter is much condensed, and the authors impress the reader with their judicial attitude of mind, with their mastery of the subjects treated, and reserve force in their statements and discussions. Working geologists the world over owe the authors something too for their having spared us another new terminology or a new system of spelling. They seem to stand godfathers only to the new petrographic nomenclature given in abstract on pages 433–8 of Vol. I.

The illustrations, especially the half-tones, are abundant, excellent, and new to our text-books, though the line drawings are hardly up to the standard of the rest of the book. The work of the book manufacturer leads us to hope that the day is not far distant when publishers will find some way of making an illustrated octavo volume of six hundred pages without its weighing close to four pounds.

The principal adverse criticisms that can be made relate to the minor details of editing —not to the subject-matter or to the method of treatment. In the presence of so much that is large, and helpful, and inspiring such criticisms seem like mere quibbling. Not a subject is touched upon in the entire work that does not have the breath of a new life breathed into it.

J. C. BRANNER.

The Eye, its Refraction and Diseases: Diseases of and Operations upon the Eyeball and its Adnexa. By EDWARD E. GIBBONS, M.D., Assistant Surgeon to the Presbyterian Eye, Ear and Throat Hospital; Demonstrator and Chief of Clinic of Eye and Ear Diseases in the University of Maryland, Baltimore. Vol. II., pp. viii + 632. New York, The Macmillan Co. 1905.

Medical text-books may be classified according to their size or according to their character. The criterion of bulk is not necessarily a high one, but if a book is made of two large volumes it must be taken seriously and permitted to enter the lists with certain approved productions of well-known teachers.

There are a few text-books that stand out preeminently with a distinct individuality, in which the author shows that he has the matter or the method to justify the book's existence. Other books owe their lives to the patronage of growing groups of students, who feel in the printed lines the personality of the teacher to whom they have listened. This class does not always appeal to the larger public, and unless the teacher is of wide and rare experience it is apt to be uneven and to consist in part of a somewhat undigested collection of statements from unproved sources. This is unfortunately the impression made by the work under consideration. The first volume, which has been reviewed in these columns, was a book of more value because the author wrote with authority. Physiological optics and its application to the refraction of the eye was evidently a familiar field, and the book was welcome because there are very few writers in our language who can treat this difficult subject clearly and interestingly. This volume deals with the diseases of the eye and shows industry and a wide acquaintance with current literature. No author can be familiar with all the methods of treating disease in these prolific times, and an open mind is justified, but it may be misleading to the student, to group methods not sufficiently tried with those of proved value, without giving marked prominence to the latter.

A few positive criticisms must be made, however thankless the task. The important subject of localization of foreign bodies in the eye is insufficiently treated. There is no allusion to the frequent association between ocular disorder and disease of the nose and neighboring sinuses, and this is the more surprising